



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,394	10/28/2003	Samantha S. H. Tan	59081-8008.US01	6372

22918 7590 01/25/2006

PERKINS COIE LLP  
P.O. BOX 2168  
MENLO PARK, CA 94026

EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
----------	--------------

1722

DATE MAILED: 01/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/696,394

Applicant(s)

TAN, SAMANTHA S. H.

Examiner

Matthew J. Song

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/28/05; 8/29/05
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 6-21, and 27-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al (US 5,882,598) in view of Tan (WO 02/15255 A1).

In a method of cleaning wafers, note entire reference, Lindquist et al teaches substrates or wafers are typically placed in a slotted cassette which is placed in a tank or process vessel containing a cleaning agent, typically an acid bath. After immersion in the acid bath, the cassette is transferred to a rinse tank in which the treated wafers are rinsed in ultrapure water.

Lindquist et al does not teach ultrasonication silicon carbide in an aqueous solution of inorganic acid and

In a method of cleaning semiconductor parts, note entire reference, Tan teaches a cleaning solution for cleaning parts includes 0.5-1.5 wt% HF, 0.1-0.5 wt% HNO<sub>3</sub>; and 1-10 wt% H<sub>2</sub>O<sub>2</sub> for cleaning SiC ceramic parts (pg 7, ln 1-25). Tan also teaches a solution of HF/HNO<sub>3</sub> or HCl/HNO<sub>3</sub> at a concentration of 10-40 wt% for each chemical (pg 7, ln 25-32). Tan also teaches SiC can be found in chamber roofs, domes, rings and collars (pg 9, ln 1-10). Tan also teaches an ultrasonication cleaning process to a surface of a part can be cleaning, spray rinsing the part with a dilute chemical mixture, and spray rinsing the part with deionized water (pg 15, ln 30 to pg 16,

Art Unit: 1722

In 5). Tan also teach an ultrasonication step in deionized water (pg 21, ln 1-10) and an ultrasonication step in a chemical bath (pg 22, ln 1-32).

Referring to claim 6, Tan teaches chemical and mechanical process are applied to the part (pg 13, ln 1-20). The mechanical processes would read on applicant's scrubbing.

Referring to claims 7-8, Tan teaches a dilute chemical solution (abstract).

Referring to claim 9, Tan teaches HF/HNO<sub>3</sub> solution at concentrations of 10-40 wt% (pg 7, ln 15-30).

Referring to claims 9-18 and 27-33, the combination of Lindquist et al and Tan does not teach all of the claimed ranges for temperature, power and frequency. These variable are result effective variable. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by optimizing the temperature, power and frequency to obtain the claimed ranges by conducting routine experimentation of a result effective variable (MPEP 2144.05).

Referring to claim 19, Tan teaches purge drying with in filtered N<sub>2</sub> and under a heat lamp for at least 1 hour (pg 23, ln 20-31) and heating in a furnace to 800°C and cooling to 200°C (pg 20, ln 10-25), this reads on applicant's baking.

Referring to claim 20, the combination of Lindquist et al and Tan teaches cooling to 200°C for 800°C, this reads on applicant's baking using 200-300°C.

Referring to claim 21, the combination of Lindquist et al and Tan does not teach the claimed baking time. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan optimizing the time to obtain the claimed time to optimize the time required ensure the wafers are dry.

3. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al (US 5,882,598) in view of Tan (WO 02/15255 A1) as applied to claims 1, 6-21, and 27-33 above, and further in view of Applicant's admitted prior art (AAPA).

The combination of Lindquist et al and Tan teach all of the limitations of claims 2-3, as discussed previously, except a CVD SiC and a sintered SiC.

AAPA teaches several forms of silicon carbide materials used in the manufacture of semiconductor wafers, such as silicon carbide pins used as lift pins, wafer rings, and showerheads. AAPA also teaches lift pins, wafer rings and showerheads can be may be either sintering or CVD (pg 1, ln 15-25).

The combination of Lindquist et al and Tan teach a process used for cleaning semiconductor equipment part made of SiC and are not particular to any particular type of SiC. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by using CVD or sintered SiC parts since both are used as equipment in semiconductor manufacturing, as taught by AAPA. Selection of a known material based on its suitability for its intended purpose is held to be obvious (MPEP 2144.07).

4. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al (US 5,882,598) in view of Tan (WO 02/15255 A1) as applied to claims 1, 6-21, and 27-33 above, and further in view of Kitabatake (US 6,273,950).

The combination of Lindquist et al and Tan teach all of the limitations of claim 4, as discussed previously, except the act of oxidizing the silicon carbide material.

In a method of a manufacturing a silicon carbide device, note entire reference, Kitabatake teaches heating a silicon carbide material in an oxygen atmosphere to form a silicon dioxide thin film on the silicon carbide crystal surface at 1100°C, and etching the silicon dioxide film from the surface to prepare a clean SiC surface (abstract and col 16, ln 35-65).

Referring to claim 5, Kitabatake teaches 1100°C. Also, temperature are obvious to optimize (MPEP 2144.05).

5. Claims 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al (US 5,882,598) in view of Tan (WO 02/15255 A1) as applied to claims 1, 6-21, and 27-33 above, and further in view of Lu et al (US 6,352,081) or Laube (US 5,660,640).

The combination of Lindquist et al and Tan teach all limitation for claim 22, as discussed previously, except the type of oven used.

In a method of cleaning semiconductor components, note entire reference, Laube teaches components are rinsed in deionized water and then are blown dry with filtered nitrogen and are subjected to a baking step for up to 3 hours in an oven having a nitrogen stream flowing therethrough. A baking temperature of 235-275 °F is used (col 5, ln 55 to col 6, ln 5). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by using a nitrogen purge oven, as taught by Laube, because nitrogen purge oven are conventionally used in the art to dry components after a DI

Art Unit: 1722

water rinse. Other types of furnaces are known in the art which are capable of drying substrates after rinsing would have been obvious to a person of ordinary skill in the art.

In a method of processing a semiconductor device, note entire reference, Lu et al teaches wafers are a deionized water rinse step is followed by a convection oven bake at 120°C for 2 hours (col 9, ln 20-45). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by using a convection oven, as taught by Lu et al, because convection ovens are conventionally used in the art to dry components after a DI water rinse. Other types of furnaces are known in the art and would have been obvious to a person of ordinary skill in the art.

Referring to claim 26, pressure is well known in the art to be a result effective variable. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al, Tan and Lu et al by optimizing the pressure to obtain the claimed pressure by conducting routine experimentation.

6. Claims 34-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al (US 5,882,598) in view of Tan (WO 02/15255 A1) as applied to claims 1, 6-21, and 27-33 above, and further in view of Southgate et al (US 5,863,801) or Gregerson (US 5,749,467).

The combination of Lindquist et al and Tan teach all of the limitations of claim 34, as discussed previously, except the system includes chemically resistant materials that are flexible.

In a method of treating a substrate in acid, note entire reference, Southgate et al teaches a cassette is made of any suitable material having characteristics of sufficient moldability for forming a cassette, sufficient strength and resistance to chemical attack, and the like, and the

Art Unit: 1722

cassette is preferably formed of a molded plastic, such as high density polyethylene (col 12, ln 35-60). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by using a polyethylene material, as taught by Southgate et al, because it is a material that is conventionally used in the art, and the selection of a known material based on its suitability for its intended purpose is held to be obvious (MPEP 2144.07).

In an apparatus for holding wafers, note entire reference, Gregerson teaches a cassette to be used is a conventional disk carrier, and is made of a suitable polymer, such as polyethylene. Gregerson also teaches the cassette can be configured for robotic handling and can be used for processing (col 6, ln 40-60). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by using a polyethylene material, as taught by Gregerson, because it is a material that is conventionally used in the art, and the selection of a known material based on its suitability for its intended purpose is held to be obvious (MPEP 2144.07).

Referring to claim 37-40, the combination of Lindquist et al, Tan and Gregerson or the combination of Lindquist et al, Tan and Southgate et al does not teach is adapted to hold lift pins or showerheads. Changes in shape are held to be obvious (MPEP 2144.04). The combination of Lindquist et al, Tan and Gregerson or the combination of Lindquist et al, Tan and Southgate et al teaches etching semiconductor components, which would include lift pins and showerheads; therefore adapting the system to handle lift pins would have been obvious to a person of ordinary skill in the art.

Referring to claim 41, duplication of parts is held to be obvious (MPEP 2144.04).



Referring to claim 42, pumps and manifolds are well known in the art and would have been obvious to a person of ordinary skill in the art.

7. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al (US 5,882,598) in view of Tan (WO 02/15255 A1) as applied to claims 1, 6-21, and 27-33 above, and further in view of Ju et al (TW 460611 A), an English abstract has been provided.

The combination of Lindquist et al and Tan teaches all of the limitations of claim 39, as discussed previously, except the system is adapted for handling showerheads.

In a method of cleaning a showerhead, note entire reference, Ju et al teaches dipping a showerhead to a solution to clean the showerhead (Abstract). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lindquist et al and Tan by using a system adapted for dipping a showerhead, as taught by Ju et al, to clean a showerhead.

### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Otsuki et al (US 6,375,752) teaches a wet chemical treatment process for sintered SiC using ultrasonic waves (abstract).

Tabara et al (US 6,147,003) teaches a cleaning effect is improved by using ultrasonic waves (col 5, ln 1-30).

Art Unit: 1722

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew J Song  
Examiner  
Art Unit 1722

MJS  
January 20, 2006

DUANE SMITH  
PRIMARY EXAMINER

*[Handwritten signature]*  
1-22-06